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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| (51) International Patent Classification 3 : G06K 19/08; B32B 27/00 | A1 | (11) International Publication Number: WO 82/ 03713<br>(43) International Publication Date: 28 October 1982 (28.10.82) |

(21) International Application Number: PCT/GB82/00117
(22) International Filing Date: 21 April 1982 (21.04.82)
(31) Priority Application Number: 8112514
(32) Priority Date: 23 April 1981 (23.04.81)
(33) Priority Country: GB

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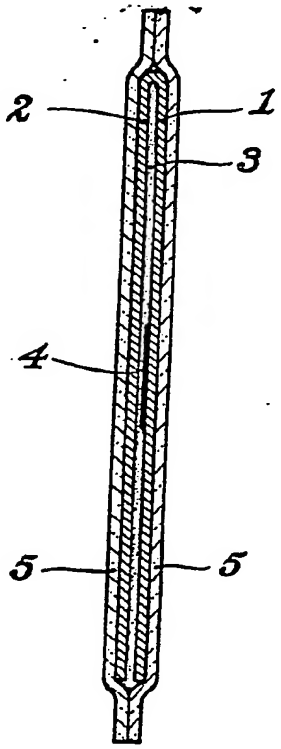
(81) Designated States: BE (European patent), DE (European patent), FR (European patent), GB (European patent), JP, NL (European patent), SE (European patent), US.

**Published**
*With international search report.*

(54) Title: SECURITY DOCUMENTS

(57) Abstract

A substantially non-translucent security document comprises a pair of sheet (1, 2) substantially non-absorbent of X-rays and β radiation between which sheets is located a security device (4) substantially absorbent of X-rays and β radiation and detectable upon inspection of the security document by X-rays and β radiation. The sheets (1, 2) are secured together by adhesive (3) and encapsulated in transparent sheets (5).



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# SECURITY DOCUMENTS

This invention relates to security documents incorporating features, markings or devices which are detectable upon examination of the document under radiation of a particular kind.

Although the invention is not so limited, the security documents of this invention are particularly useful as identity cards or the like.

According to this invention a substantially non-translucent security document comprises a pair of sheets in, at least partial, face to face surface abutting relationship, each of said sheets being substantially non-absorbent of X-rays and $\beta$ radiation and between said sheets, a security device substantially absorbent of X-rays and $\beta$ radiation and detectable upon inspection of the security document by X-rays or $\beta$ radiation.

Preferably, the security document is sufficiently opaque to electro-magnetic radiation (other than X-rays) to render it difficult, if not impossible, readily to detect the present of the security device when the document is examined by techniques utilising the transmission or reflection of such electro-magnetic radiation.

Preferably the sheets are fibrous, for example, paper of between 70 and 400 gms/sq metre and more particularly of between 90 and 300 gms/sq metre. Alternatively, the sheets may be of other materials, for example, synthetic polymeric materials.

Preferably the security device is printed on one of the abutting surfaces in an ink incorporating a metal or inorganic metallic compound to the extent, on a weight by weight basis, of between 30 and 80%.

Preferably, so as to minimise the risk that the security device may be detected by inspecting the document by non X-ray techniques, such as by subjecting it to the transmission of visible light, the security device is printed in an ink which has a colour closely matching that of the sheet on which it is printed and which has substan-

tially the same light transmitting properties as the said sheet. In so far as the printing of such a security device may cause production control problems because of the "invisible" nature of the printing, the security device may be printed in a doped ink which includes traces of such as visible pigments or U.V. Fluoresers sufficient to overcome said production control difficulties without rendering the security device detectable by non X-ray, electro-magnetic radiation detection techniques.

The inorganic compound may be a barium, tungsten, bismuth, titanium, neodymium, or lead compound or any other heavy metal compound sufficiently absorbent of X-rays and $\beta$ radiation to permit detection of the device by X-ray and $\beta$ radiation detection techniques.

The printed impression comprising the security device is preferably a very thin surface printing having an applied thickness of less than about 30 microns and preferably of about 15 microns or less. It may be applied by any, especially off-set, printing method or technique capable of giving rise to such a printed impression.

When a metal is used it may be applied as particles within the ink or as a thin preformed foil having a thickness no greater than about 100 microns and preferably of up to 50 microns.

The security feature may be of a design or shape which may be recognised as such when the document is subjected to X-rays or $\beta$ radiation.

The exposed surfaces of the sheet materials may bear printed or other devices or legends which are typically to be found on the surface of security documents, provided that such devices or legends are not substantially absorbent of said X-ray and $\beta$ radiation.

The sheet materials may be encapsulated between adhesively secured or heat-sealed transparent surface sheets which are not substantially absorbent of X-rays and $\beta$ radiation. Typically each such encapsulating sheet may have a substance of about 20 gms per square metre.

Preferably sheet materials of the pair are adhesively

bonded one to another, either around their edges or more extensively between their abutting surfaces. Conveniently the said pair is formed from a centre-folded single sheet.

We have found that soft X-rays of wavelength of up to 2.0 Angstroms and more particularly about 1.0 Angstrom are particularly useful in relation to the documents of this invention. X-ray cameras and films may be used in the detection of the security documents of this invention but any other suitable apparatus, such as one using scintillation techniques may alternatively be employed.

By way of example, when $\beta$ radiation inspection techniques are used to detect the security device, a plastics block impregnated with Carbon 14 may be placed on a security document which, in turn, is overlying a film of photographic material. After this latter assembly has been left for a sufficient period, perhaps of about fifteen hours, the photographic film is developed thus to reveal a record of a security device which is opaque to $\beta$ radiation.

Attempted counterfeiting of the security documents of this invention may result in the production of documents which are deficient in some material respect in relation to the security device of a genuine document.

However, verification of the genuineness of a security document according to this invention may readily be effected particularly by means of X-ray radiation and when this is done, for example at a port or airport, in relation to an identity card, the apprehension of the holder of a counterfeit document, if not of the counterfeiter, is probable.

By way of example, the following are ink compositions which may be used to provide the security devices of this invention. All percentages are on a weight by weight basis.

| | |
|---|---|
| **INK 'A'** | |
| Barium Sulphate | 70% |
| Alkyd Resin | 24% |
| 260/290 Petroleum distillate | 5% |
| Cobalt driers | 1% |
| **INK 'B'** | |
| Bismuth Oxychloride | 50% |
| Alkyd Resin | 46.5% |
| 260/290 Petroleum distillate | 2.5% |
| Cobalt driers | 1.0% |
| **INK'C'** | |
| Barium Sulphate | 49% |
| Alkyd resin varnish | |
| Pigment grinding medium | 16% |
| Blending vehicle | 22.5% |
| Soft Paraffin Wax | 8.5% |
| Cobalt drier | 1.0% |
| Oxime Anti-oxidant | 1.0% |
| Dope Ink | 2.0% |

N.B. The Dope Ink is included to render the otherwise "invisible" impressions made from Ink C sufficiently discernible for press control purposes; also that the composition of Ink C may be adjusted so as to include about 3% or less of Linseed Oil, thereby to modify the rheology of the ink.

One identity card according to this invention is illustrated diagrammatically in the accompanying drawing.

Layers 1 and 2 of the drawing are formed from a centre folded sheet having a mass of 150 gms sq metre.

On the surface of layer 1 which abuts layer 2 is shown a security device 4 printed in Ink A, prior to the folding of the sheet, by the off-set litho process.

An adhesive bonding the layers 1 and 2 is depicted at 3.

Encapsulating layers of composite polyethylene terephthalate/polyethylene transparent sheets are shown at 5 with the polyethylene components bonded and/or heat sealed to each other and to the layers 1 and 2.

A FAXITRON, Model 8040, X-ray camera using a Kodak Industrex C type film was exposed for one minute at 0.5mA and 13 Kv to make a record of the device.

CLAIMS:-

1. A substantially non-translucent security document comprising a pair of sheets in, at least partial, face to face surface abutting relationship, each of said sheets being substantially non-absorbent of X-rays and $\beta$ radiation and between said sheets, a security device substantially absorbent of X-rays and $\beta$ radiation and detectable upon inspection of the security document by X-rays or $\beta$ radiation.

2. A security document as claimed in claim 1 in which the security device is substantially absorbent of X-rays of wave-lengths between 0.1 and 10.0 Angstroms.

3. A security document as claimed in claim 2 in which the security device is substantially absorbent of X-rays of wave lengths between 0.1 and 2.0 Angstroms.

4. A security document as claimed in any of the preceding claims in which said sheets comprise a fibrous material.

5. A security document as claimed in claim 4 in which said sheets are paper sheets of between 85 and 400 gms per sq metre.

6. A security document as claimed in claim 5 in which the paper sheets are of between 90 and 300 gms per sq metre.

7. A security document as claimed in any of claims 1 to 3 in which said sheets are of non-fibrous synthetic polymeric materials.

8. A security document as claimed in any one of the preceding claims in which said security device comprises an ink-printed impression upon one of said sheets.

9. A security document as claimed in claim 8 in which the impression is of an ink comprising an inorganic metallic compound.

10. A security document as claimed in claim 9 in which the ink comprises a compound of barium, tungsten, bismuth, titanium, neodymium or lead.

11. A security document as claimed in either of claims 9

and 10 in which the inorganic compound is present in the ink to the extent of between 30% and 80% on a weight by weight basis.

12. A security document as claimed in claim 8 in which the impression is of an ink comprising a metal in finely particulate form.

13. A security document as claimed in any one of claims 8 to 12 in which the inked impression is a surface printing of a thickness of less than 30 microns.

14. A security document as claimed in any one of claims 8 to 13 in which the inked impression closely matches the colour of the sheet on which said impression is printed.

15. A security document as claimed in any one of claims 18 to 14 in which the inked impression has light transmission properties which are substantially identical to those of the sheet on which the security device is printed.

16. A security document as claimed in any one of claims 1 to 7 in which the security device comprises a preformed metallic foil of a thickness less than 100 microns.

17. A security document as claimed in any one of the preceding claims in which said pair of sheets is constituted by a folded single sheet.

18. A security document as claimed in any one of the preceding claims in which the sheets of said pair are adhesively bonded one to another at least around their abutting peripheries.

19. A security document as claimed in any one of the preceding claims bearing surface markings which are substantially non-absorbent of X-rays and $\beta$ radiation.

20. A security document as claimed in any one of the preceding claims in which said pair of sheets is encapsulated between transparent films of a material substantially non-absorbent of X-rays and $\beta$ radiation.

21. A security document as claimed in claim 20 in which each encapsulating sheet comprises a synthetic polymeric material having a substance of between 10 and 40 gms/sq metre.

22. A security document as claimed in any one of the preceding claims in the form of a personal identity document.

23. A security document substantially as herein exemplified and illustrated.

24. A method of detecting a security device within in a security document as claimed in any one of the preceding claims comprising exposing the security document to X-rays and making a photographic record of said exposure.

25. A method of detecting a security device in a security document as claimed in any one of claims 1 to 23 comprising exposing the security document to a source of $\beta$ radiation and making a photographic record of said exposure.

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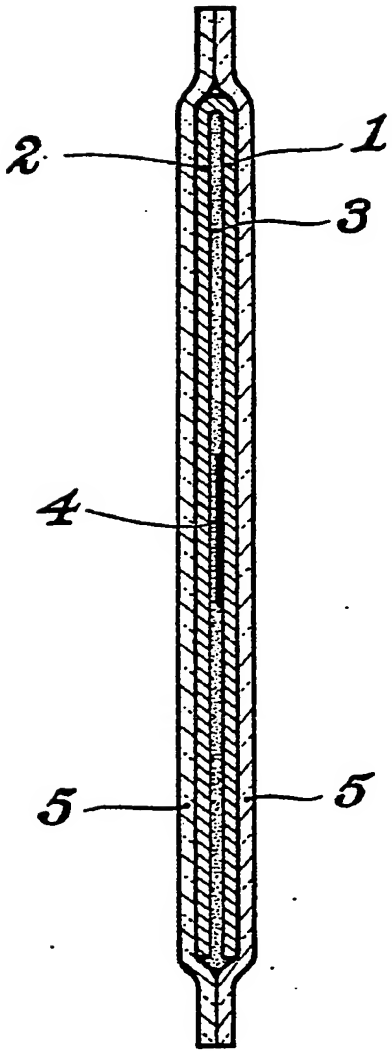

# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 82/00117

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[3]: G 06 K 19/08; B 32 B 27/00

## II. FIELDS SEARCHED

Minimum Documentation Searched [4]

| Classification System | Classification Symbols |
|---|---|
| IPC[3] | B 32 B; G 06 K |

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

## III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

| Category * | Citation of Document, [16] with indication, where appropriate, of the relevant passages [17] | Relevant to Claim No. [18] |
|---|---|---|
| A | DE, A, 2305165 (TRANSACTION TECHNOLOGY INC.) 9 August 1973, see page 3, lines 7-35; page 4; page 6, lines 15-27 * | 1,19 |
| A | US, A, 4120445 (L.A. CARRIER) 17 October 1978 | |
| A | US, A, 3594933 (B.W. COOPER) 27 July 1971 | |
| A | FR, A, 1578095 (A.B. CEAVERKEN) 14 August 1969 | |
| A | GB, A, 1123274 (VIRGINIA LAMINATING COMP.) 14 August 1968 | |

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## IV. CERTIFICATION

| Date of the Actual Completion of the International Search [1] | Date of Mailing of this International Search Report [2] |
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| 16th July 1982 | 4th August 1982 |
| **International Searching Authority [1]** | **Signature of Authorized Officer [20]** |
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